

WHAT IS CLAIMED IS:

1. A bipolar current collector separator for a fuel cell composed of a metal plate having flow channels and contact faces that come into contact with electrodes or collectors, wherein a corrosion-resistant layer is disposed on each of said flow channels.

2. The bipolar current collector separator according to claim 1, wherein said metal plate is made of aluminum or an aluminum alloy, and said corrosion-resistant layer is an anodized aluminum layer.

3. The bipolar current collector separator according to claim 2, wherein said anodized aluminum layer is composed of a dense anodized aluminum layer having a porosity of less than 5%.

4. The bipolar current collector separator according to claim 3, wherein said dense anodized aluminum layer has a thickness of 5 to 50 μm .

5. The bipolar current collector separator according to claim 2, wherein said anodized aluminum layer is composed of a dense anodized aluminum layer having a porosity of less than 5 %, and a porous anodized aluminum layer having a porosity of 5 % or more provided on said dense anodized aluminum layer.

6. The bipolar current collector separator according to claim 2, wherein said aluminum has a purity of 99.5 % or more.

7. The bipolar current collector separator according to claim 2, wherein a corner portion formed between surfaces of said flow channel is in shape of a curved surface having a curvature radius of 0.5 mm or more.

8. The bipolar current collector separator according to claim 2, wherein a corner portion formed between a side surface of said flow channel and said contact face is in shape of a curved surface having a curvature radius of 0.3 mm or more.

9. The bipolar current collector separator according to claim 1, wherein said corrosion-resistant layer is a heat-resistant polymer layer.

10. The bipolar current collector separator according to claim 9, wherein
said heat-resistant polymer layer is water repellent.

11. The bipolar current collector separator according to claim 9, wherein
said heat-resistant polymer layer is made of a polymer material selected from the
5 group consisting of vinyl resins, polyvinyl chloride, polytetrafluoroethylene,
polyvinylidene fluoride, aromatic polyamides, polyimides, polycarbonates,
polybutylene terephthalate, polyethylene terephthalate, polyesters, polystyrene,
copolymers of styrene and another monomer, polyethylene, polypropylene,
polyurethanes, silicone resins, polysulfones, polyethersulfones, rayon, cupra,
10 acetate resins, promix, vynylon, vinylidene resins, acrylic resins and derivatives
thereof.

12. The bipolar current collector separator according to claim 9, wherein
said heat-resistant polymer layer has a multi-layered structure comprising two or
more layers.

13. The bipolar current collector separator according to claim 9, wherein
said metal plate is made of aluminum or an aluminum alloy.

14. The bipolar current collector separator according to claim 13, wherein an
anodized aluminum layer is provided on said flow channel, said heat-resistant
polymer layer being disposed on said anodized aluminum layer.

20 15. The bipolar current collector separator according to claim 14, wherein
said anodized aluminum layer is composed of a porous anodized aluminum
layer having a porosity of 5 % or more.

16. The bipolar current collector separator according to claim 14, wherein
said anodized aluminum layer is composed of a dense anodized aluminum layer
25 having a porosity of less than 5 %, and a porous anodized aluminum layer
having a porosity of 5 % or more provided on said dense anodized aluminum
layer.

17. The bipolar current collector separator according to claim 13, wherein
said aluminum has a purity of 99.5 % or more.

18. The bipolar current collector separator according to claim 1, wherein a conductive film is disposed on said contact face.

19. The bipolar current collector separator according to claim 18, wherein said conductive film is made of: a metal selected from the group consisting of Pt, Au, Pd, Ru, Rh, Ir, Ag, mixtures thereof and alloys composed thereof; carbon; or a conductive carbide.